U.S. Environmental Protection Agency (EPA)
Region III
701 Mapes Road
Fort Meade, Maryland 20755-5350

US EPA - Region III

Quality Assurance Project Plan

Template

Draft

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DISCLAIMER

This EPA Quality Assurance Project Plan (QAPP) Template is a generic format to be used for generating a QAPP. Prior to environmental data collection, a QAPP must be submitted to EPA Region III for review and approval. This template is not to be used as a project planning tool for performing Superfund National Priorities List (NPL) investigations.

The technical specifications in this QAPP Template do not supercede state, local and/or site-specific Applicable, Relevant and Appropriate Requirements (ARARs).

This document has been derived from the US EPA Quality Assurance Guidance for Conducting Brownfields Site Assessments, EPA Region 2 Brownfields Project Planning Guidance and US EPA QA/R-5: EPA Requirements for Quality Assurance Project Plans.

Title and Approval Page

_____

Document Title

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Day/Month/Year

Cooperative Agreement Recipient:_____

Signature

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Printed Name/Date

Project QA Officer:_____

Signature

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Printed Name/Date

U.S. EPA Project Manager Approval:_____

Printed Name/Date

_____

Printed Name/Date

TABLE OF CONTENTS

PROJECT MANAGEMENT **Page Number**

MEASUREMENT/DATA ACQUISITION

ASSESSMENT AND OVERSIGHT

DATA VALIDATION AND USABILITY

TABLES

APPENDICES

PROJECT MANAGEMENT

A1 PROJECT ORGANIZATION AND RESPONSIBILITY

Develop an organizational chart that identifies the chain of command of each person in the bulleted list. Include titles, responsibilities and organizational affiliation of all project participants. Attach the project's organizational chart. The organizational chart should be labeled Figure 1.1.

The organizational chart provided in Figure 1.1 identifies the individuals responsible for:

- Overall project coordination.
- Overall QA.
- Systems auditing (on-site evaluations).
- Performance auditing.
- Sampling operations.
- Sampling QC.
- Laboratory analyses.
- Laboratory QC.
- Data processing activities.
- Data processing QC.
- Data quality review.

Certain key individuals may be responsible for more than one of the aforementioned project functions. The organizational chart provides sufficient evidence that the lines of authority for all referenced organizations (including contractors and subcontractors) is appropriate to accomplish the QA objectives of this project.

A2 SITE INFORMATION/BACKGROUND

Include relevant characteristics of the site, such as site location, site use history, suspected locations and identification of contaminants, range of contaminant concentrations, media that may be affected, likely migration routes, the surrounding zoning area (rural, residential, industrial) and regulatory history. When applicable, cite previous studies that indicate why the project is needed.

A3 PROJECT DESCRIPTION

Briefly state the problem that the data collection project is designed to solve and/or the decisions to be made (i.e., the project objectives). Identify the information that will be needed to make informed, defensible decisions and how this information will be obtained. Also, identify what is the geographical extent and time and budget constraints for the project.

It is recommended that a planning process similar to the Data Quality Objective(DQO) found in EPA QA/G-4: Guidance for the Data Quality Objectives Process be used for this project. Provide a description of the work to be performed, identify the media to be sampled, Applicable or Relevant and Appropriate Requirements (ARARs), proposed action levels.

Provide a brief summary of the DQO process: identify the decision(s) to be made; identify what information is needed to make informed, defensible decisions; define the boundaries of this investigation (geographical extent and time/budget constraints); state the decision rule ("if...then" statement(s) that relate the data to the decision to be made; provide an estimate of how much uncertainty will be tolerated in the site decision(s).

A4 PROJECT TIME LINE

The progress of this project will be tracked from its inception through implementation to ensure all sampling and analytical activities are performed in a correct and cost effective manner. Each step in this process will be scheduled in an objective and realistic time frame to assure that adequate attention is devoted to the minimization of effort and the maximization of information. Table I provides a project time line for this project.

A5 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data collected from this project will be used to:

Select the appropriate objective(s) from the following list. Additional objectives may be added.

- Ascertain if there is a threat to public health or the environment.
- Locate and identify potential sources of contamination. Sampling data will be used to formulate remediation strategies, and estimate remediation costs.
- Determine treatment and disposal options. Characterize soil for on-site or off-site treatment.
- Verify attainment of clean-up goals. Ascertain if additional remediation is required.

When conducting this investigation, all measurements will be made so that results are reflective of the medium and conditions being measured. Prior to all environmental measurement activities, Data Quality Objectives and measurement performance criteria will be determined. Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of the environmental monitoring data required to support decisions. DQOs are predicated in accordance with the anticipated end uses of the data which are to be collected. DQOs are applicable to phases and aspects of the data collection process including site investigation, design, construction, and remedy operations. It is important to note that the level of detail and data quality needed will vary with the intended use of the data.

Data Quality Objectives are typically assessed by evaluating PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability) of all aspects of the data collection

process. PARCC is defined as:

- Precision; a measure of the reproducibility of analyses under a given set of conditions.
- Accuracy; a measure of the bias that exists in a measurement system.
- Representativeness; the degree sampling data accurately and precisely depict selected characteristics.
- Completeness; the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under “normal” conditions.
- Comparability; the degree of confidence with which one data set can be compared to another.

To assess if environmental monitoring measurements are of an appropriate quality, the general PARCC requirements found in Section D.3 of this document and Measurement Quality Objectives (MQOs) for precision, accuracy and completeness found in Table 2 will be compared to the quality objectives and measurement performance criteria.

Table 2 provides the measurement quality objectives for this project.

MEASUREMENT/DATA ACQUISITION

B1 SAMPLING DESIGN

Describe the design of the sampling network and the rationale for the design. Also, include a list of sampling locations and frequencies and sample matrices.

Table 3 provides the types and number of samples and analyses required for this project. Figure(s) ____ *{provide copies of site maps with sample locations}* are site maps with specific sample locations.

B2 SAMPLING METHODS REQUIREMENTS

The purpose of performing this investigation is to determine the presence and identity of contaminants along with the extent to which they have become integrated into the surrounding environment. The objective of this effort is to collect and analyze a sample which is representative of the media under investigation. The methods and equipment used for sampling environmental matrices vary with the associated physical and chemical properties.

For each anticipated sampling media (i.e., surface water, sediment, soil, groundwater, surface geophysics, ecological sampling, etc.), describe the sampling procedures to be used. Describe the sampling equipment, equipment decontamination procedures, sample collection, sample preservation procedures. If samples are to be composited, please include these procedures. Please be advised, samples for volatile organic analyses can not be composited in the field. If samples are to be filtered, please describe field filtration procedures. Also describe any field analytical procedures that may be used during sampling, such as the collection of pH, conductivity, turbidity during the purging of groundwater wells.

If SOPs for these activities exist, reference them in the text and place a copy of the SOP in an Appendix.

Specific requirements for sampling may be found in the following guidance documents:

US EPA Office of Solid Waste and Emergency Response. January 1991. Compendium of ERT Surface Water and Sediment Sampling Procedures. EPA/540/P-91/005.
US EPA Office of Solid Waste and Emergency Response. January 1991. Compendium of ERT Groundwater Sampling Procedures. EPA/540/P-91-007.
US EPA Office of Solid Waste and Emergency Response. January 1991. Compendium of ERT Soil Sampling and Surface Geophysics Procedures. EPA/540/P-91/006.
US EPA Office of Emergency and Remedial Response. December 1995. U.S. EPA Superfund Program Representative Sampling Guidance, Volume 1: Soil. OSWER Directive 9360.4-10, Interim Final, EPA/540/R-95/141.
US EPA Office of Emergency and Remedial Response. December 1995. Superfund Program Representative Sampling Guidance, Volume 5: Water and Sediment, Part 1 - Surface Water and Sediment. OSWER Directive 9360.4-16, Interim Final.

US EPA Office of Emergency and Remedial Response. December 1995. Superfund Program Representative Sampling Guidance, Volume 5: Water and Sediment, Part II - Ground Water. OSWER Directive 9360.4-16, Interim Final.

To ensure that uniform and acceptable sampling protocols for each project are being used, the sampling requirements found in Table 3 and Table 4 will be used.

B.2 SAMPLING HANDLING AND CUSTODY REQUIREMENTS

Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the particular sample, and delineate the following information:

Site name and designated project number.
Sample identification number.
Date and time the sample was collected.
Sample preservation method.
Sample pH.
Analysis requested.
Sampling location.

All samples will be maintained in accordance with the following chain of custody procedures. A sample is under custody when it is:

In a person's physical possession
In view of that person after he/she has taken possession
Secured by that person so that no one can tamper with the sample
Secured by that person in an area which is restricted to authorized personnel.

A chain-of-custody record must always be maintained from the time of sample collection until final deposition. An example of a chain of custody form is found in *Figure 3. (Attach a copy of a blank chain of custody form and label as Figure 3)*. Every transfer of custody will be noted and signed for with a copy of the record being kept for each individual which endorsed it. At a minimum, the chain-of-custody record will include the following information:

- Contractor name and address.
- Sample identification number.
  Sample location.
  Sample collection date and time.
  Sample information, i.e., matrix, number of bottles collected, container type, etc.
  Names and signatures of samplers.
  Signatures of all individuals who have had custody of the samples.

When preparing sample containers for shipment they will be securely sealed. The custody seals will be used to demonstrate that a sample container has not been opened or tampered with. The individual who has sample custody shall always sign, date, and affix the custody seal to the sample container in such a manner that it cannot be opened unless it is broken. When samples are not under direct control of the individual responsible for them, they will be stored in a container which will be affixed with a custody seal.

Samples will then be an appropriate transport container and packed with an appropriate absorbent material such as vermiculite. All sample containers will be packed to maintain a temperature of 4 C. A temperature blank will be added to each transport container. When the transport container is received in the laboratory, the laboratory sample custodian will use this container of water to measure the temperature within the transport container. All sample documentation will then be affixed to the underside of each transport container lid. The transport container lid will then be closed and affixed with a custody seal accordingly. Samplers will transport environmental samples directly to the laboratory within 24 hours of sample collection, or utilize an overnight delivery service within 24 hours of sample collection.

All of the appropriate U.S. Department of Transportation (U.S. DOT) regulations for packaging, marking/labeling, and shipping hazardous materials and wastes will be followed. Air carriers which transport hazardous materials, in particular Federal Express, will comply with the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations. The IATA regulations detail the procedures to be used to enable the proper shipment and transportation of hazardous materials by a common air carrier. Following all of the current IATA regulations will ensure compliance with U.S. DOT.

B3 ANALYTICAL METHODS REQUIREMENTS

Analytical methods will be selected that will achieve project objectives. Table 3 provides information about the analytical methods (including any extraction or digestion methods) being used for this project. Additional information about analytical methods requirements (MDL, PQL, etc.), laboratory quality control requirements and laboratory equipment calibration procedures can be found in Appendix B. Standard Operating Procedures (SOPs) for all field screening methods and for non-EPA approved methods are included in an Appendix to this document. *EPA considers most methods developed by ASTM, NIOSH and the APHA/AWWA/WEF (Standard Methods for the Examination of Water and Wastewater) EPA approved methods. SOPs for all analytical and field methods may be included in Appendix A.*

B4 QUALITY CONTROL REQUIREMENTS

The field quality control requirements found in Table 5 will be followed during this investigation. Appendix B includes quality control requirements for the laboratory.

B5 INSTRUMENT/EQUIPMENT MAINTENANCE REQUIREMENTS

All field equipment will be maintained in accordance with each respective instrument manufacturer's operating instructions. All maintenance activities will be recorded in a log book. For field equipment, the preventive maintenance information found in Table 6 will be used. When the acceptance criteria is not met, the corrective action found in Table 6 will be implemented. Analytical equipment will be maintained in accordance with procedures found in Appendix B.

Describe the availability of spare parts identified in the manufacturer's operating instructions. If SOPs exist, include them in an Appendix to this document.

B6 INSTRUMENT CALIBRATION AND FREQUENCY

All field equipment will be calibrated following the procedures found in Table 7. When the acceptance criteria is not met, the corrective actions found in Table 7 will be implemented. Analytical equipment will be calibrated in accordance with procedures found in Appendix B.

B7 DATA MANAGEMENT

1.0 Sample Documentation

All sample documents will always be legibly written in ink. Any corrections or revisions to sample documentation shall be made by lining through the original entry and initialing any changes. To reiterate these requirements the following sub-sections are provided to outline sample documentation procedures which will be employed when conducting this investigation.

1.1 Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate and factual account of field procedures may be reconstructed. All entries will be signed by the individuals who are making them. All field logbook entries will document the following specifics:

- Site name and project number.
- Contractor name and address.
- Names of personnel on site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain of custody information.
- Records of photographs.
- Site sketches.
- All relevant and appropriate information delineated in field data sheets and sample labels.

1.3 Standard Operating Procedures

Often many laboratory and field operations are arranged to form Standard Operating procedures (SOPs). Whenever SOPs are applicable and available, they will be incorporated into the data collection activities pursuant to a investigation. To ensure environmental sample

collection efforts are comparable, procedures found in sampling SOPs will be followed. The sampling SOPs are found in Appendix A. Appendix A also includes SOPs for all field screening methods and for non-EPA approved methods.

1.4 Field Data Records

All real-time measurements and observations must always be recorded in project log books, field data records, or in similar types of record keeping books. Field data records will be organized into standard formats whenever possible, and retained in permanent files.

1.5 Analytical Data Deliverable Requirements

At a minimum, the analytical data deliverable package for screening and definitive data will include the following:

Sample documentation (location, date and time of collection and analysis, etc.)
Chain of custody
Initial and continuing calibration
Determination and documentation of detection limits
Analyte(s) identification
Analyte(s) quantitation
QC blanks
Matrix spike recoveries
Quality Control sample results
Duplicate results

Prior to the submission of laboratory data, the laboratory's Quality Assurance Officer will review the data for accuracy, precision and completeness.

1.6 Data Management

Describe the project data management scheme, tracing the path of the data from their generation in the field or laboratory to their final use or storage. ***A flowchart may be used.*** *Describe the record keeping procedures and the approach used for data storage and/or retrieval on electronic media. Discuss the control mechanism for detecting and correcting errors and for preventing loss of data during data reduction, data reporting and data entry. Identify and describe all data handling equipment and procedures to process, compile and analyze data. Describe the procedures that will be followed to demonstrate acceptability of hardware/software configurations required.*

ASSESSMENT AND OVERSIGHT

C1 PERFORMANCE AND SYSTEMS AUDITS

During this investigation, internal and external performance and systems audits will be undertaken to evaluate the capability and performance of the total measurement system. Audits will be utilized to ensure that field and laboratory activities will provide data reflective of the site and it conditions.

A performance audit is performed to evaluate the accuracy of the total measurement system or component thereof. A systems audit focuses on evaluating the principal components of a measurement system to determine proper selection and use. In regard to field sampling operations, this oversight activity is performed to critique the quality control procedures which are to be employed. Systems audits of this nature are to be performed periodically prior to or shortly after field operations commence and until the project is completed.

Identify the title of the person who will conduct audits for field and laboratory activities. Describe the protocol that will be used for audits. Define the acceptance criteria for these audits.

C2 REPORTS TO MANAGEMENT

Identify the frequency and distribution of reports issued to inform management of the following:

Status of the project
Results of Performance Evaluations and Systems Audits
Results of periodic data quality assessments
Significant quality assurance problems and recommended solutions
Changes in the QAPP

Identify the preparer and the recipients of the reports.

DATA VALIDATION AND USABILITY

D1 REVIEW OF FIELD DATA

Describe the criteria to be used to review field data (i.e., calibration results, site location information, etc.) for accuracy and precision.

D2 DATA VALIDATION

To ensure that measurement data generated when performing this investigation are of an appropriate quality, all data will be validated. Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use. It requires that the techniques utilized are applied to the body of the data in a systematic and uniform manner. The process of data validation must be close to the origin of he data, independent of the data production, and objective in its approach.

All data from this project will be validated in accordance with the IM1 and M2 level of data validation found in the Region III Innovative Approaches to Data Review Guidance Document. (June 95) *If data is being used for risk assessment, it must be validated in accordance with the Region III Modifications to the National Functional Guidelines for Organic Data Review (9/94) and the Region III Modifications to the National Guidelines for Inorganic Data Review (4/93). A copy of these guidance documents can be obtained from OASQA - Quality Assurance Team. Contact May Edwards at* (410) 305-2736.

D3 RECONCILIATION WITH USER REQUIREMENTS

1.0 Accuracy

Accuracy will be assessed through the analysis of quality control samples. The analytical accuracy will expressed as the percent recovery (%R) of an analyte which has been added to the environmental sample at a known concentration before analysis and is calculated according to the following equation.

$$\%R\ 100 \times \frac{S\ U}{C_{sa}}$$

where: %R = percent recovery
S = measured concentration in spiked aliquot
U = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

The following formula should be used to for measurements where a standard reference material is used:

$$\%R\ 100 \times \frac{C_m}{C_{rm}}$$

Where: %R = percent recovery
C_m = measured concentration of standard reference material
C_{rm} = actual concentration of standard reference material

1.1 Precision

Precision will be determined through the use of field duplicates, matrix spike/matrix spike duplicates and duplicate quality control samples. The Relative Percent Difference (RPD) between the two results will be calculated and used as an indication of the precision of the analyses performed.

The following formula should be used to calculate precision:

$$RPD\ \frac{(C_1\ C_2)}{(C_1\ C_2)/2} \times 100$$

Where: RPD = relative percent difference
C_1 = larger of the two observed values
C_2 = smaller of the two observed values

1.2 Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data completeness will be expressed as the percentage of valid data obtained from the measurement system. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria required by the prescribed analytical method.

The following formula should be used to calculate completeness:

$$\%C = 100 \times \frac{V}{n}$$

Where: %C = percent completeness

V = number of measurements judged valid

n = total number of measurements necessary to achieve a specified statistical level of confidence in decision making.

Describe how the results obtained from the project will be reconciled with the project's data quality objectives. Describe how issues will be resolved and discuss how the limitations on the use of the data will be reported to decision makers.

TABLES

TABLE I
PROJECT TIME LINE

Create an overall project timetable that outlines beginning and ending dates for the entire project, as well as, specific activities and products within the project as follows:

Activities *(Includes Products and/or Services)*	Dates *(MM/DD/YY)*	
	Activity Start Date	Activity End Date

TABLE 2
MEASUREMENT QUALITY OBJECTIVES

Compound	Matrix	Action Limit[1]	Precision	Accuracy	Completeness

[1]Include the concentration units

TABLE 3
SAMPLING AND ANALYTICAL METHODS REQUIREMENTS

Matrix	Parameter[1]	Number of Samples	Sampling Procedure[2]	Sample Preparation/Extraction Method Number	Analytical Method Number
	Volatile Organics (VOCs)				
	Semi-volatile Organics				
	Pesticides/Aroclors (PCBs)				
	Total Metals				
	Cyanide				
	Add Additional Parameters				

[1]May include other categories of analyses or individual analyses
[2]Insert the QAPP page number or the SOP number from the QAPP's Appendix A

TABLE 4

Sample Containers, Preservation, Holding Times

Matrix	Sampling SOP No.	Parameter/Fraction	Minimum Sample Volume[1]	Sample Container[2]	Sample Preservation	Technical Holding Time
Soil		Volatile Organics (VOCs)	4 oz.	2 oz. clear wide-mouth glass with Teflon lined septum.	Cool to 4°C	14 days
		Acid Extractable Organics Base & Neutral Organics (BNAs)	4 oz.	4 oz. amber wide-mouth glass with Teflon lined cap.	Cool to 4°C	7 days extract; 40 days analyze
		Pesticides/Aroclors (PCBs)	4 oz.	4 oz. amber wide-mouth glass with Teflon lined cap.	Cool to 4°C	7 days extract; 40 days analyze
		Total Metals	6 oz.	8 oz. clear wide-mouth glass with Teflon lined cap.	Cool to 4°C	180 days; (28 days Hg)
		Cyanide	6 oz.	8 oz. clear wide-mouth glass with Teflon lined cap.	Cool to 4°C	14 days
		Add information for other parameters to be measured				

Legend:

[1] Triple volume is required for matrix spike/matrix spike duplicate (MS/MSD) analysis.

[2] *In the legend of the table include the source of contaminant-free sample containers.* All sample bottles must comply with the standards outlined in the following reference:
U.S. EPA (Environmental Protection Agency). December 1992. *Specifications and Guidance for Contaminant-Free Sample Containers*. OSWER Directive #9240.0-05A, EPA 540/R-93/051. Office of Solid Waste and Emergency Response, Washington, DC.

TABLE 4
Sample Containers, Preservation, Holding Times

Matrix	Sampling SOP No.	Parameter/Fraction	Minimum Sample Volume[1]	Sample Container[2]	Sample Preservation	Technical Holding Time
Aqueous		Volatile Organics (VOCs)	80 ml	40 ml VOC vial with Teflon lined septum.	1:1 HCl to pH<2; Cool to 4°C; 25 mg Ascorbic Acid[3]	14 days
		Acid Extractable Organics Base & Neutral Organics (BNAs)	2 Liters	1 Liter amber glass with Teflon lined cap.	Cool to 4°C; 80 mg $Na_2S_2O_3$ (sodium thiosulfate)[4]	7 days extract; 40 days analyze
		Pesticides/Aroclors (PCBs)	2 Liters	1 Liter amber glass with Teflon lined cap.	Cool to 4°C	7 days extract; 40 days analyze
		Total Metals	1 Liter	1 Liter HDPE bottle with Teflon lined cap.	1N HNO_3 to pH<2; Cool to 4°C	180 days (28 days Hg)
		Cyanide	1 Liter	1 Liter HDPE bottle with Teflon lined cap.	NaOH to pH>12; Cool to 4°C; 25 mg Ascorbic Acid[3]	14 days[5]
		Add information for other parameters to be measured				

Legend:

1 Triple volume is required for matrix spike/matrix spike duplicate (MS/MSD) analysis.

2 *In the legend of the table include the source of contaminant-free sample containers.* All sample bottles must comply with the standards outlined in the following reference:
U.S. EPA (Environmental Protection Agency). December 1992. *Specifications and Guidance for Contaminant-Free Sample Containers*. OSWER Directive #9240.0-05A, EPA 540/R-93/051. Office of Solid Waste and Emergency Response, Washington, DC.

3 Ascorbic Acid should only be used in the presence of residual Chlorine.

4 Sodium thiosulfate ($Na_2S_2O_3$) should only be used in the presence of residual Chlorine.

5 Maximum holding time is 24 hours when sulfide is present.

TABLE 5
Field Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
Field Duplicate	One per twenty samples per matrix or one per day, whichever is more frequent.		
Split Sample	10% of field screening data will be confirmed with data from a fixed laboratory.[1]		
MS/MSD[2]	One per twenty samples per matrix or one per day, whichever is more frequent.		
Equipment Rinsate Blank	One per twenty samples per matrix per equipment type per decontamination event or one per day, whichever is more frequent.		
Field Blank	One per twenty samples per matrix or one per day, whichever is more frequent.		
VOA Trip Blank	One for each cooler which contains samples for VOA analyses.		
Cooler Temperature Blank	One per cooler.		
Other (*Specify*)			

Legend:
[1] Per Superfund Data Quality Objectives Process for Superfund
[2] Sufficient sample will be collected to allow the laboratory to perform this analysis.

Table 6
Preventive Maintenance - Field Equipment

Identify field equipment and/or systems requiring periodic preventive maintenance. Describe the activity, such as check the battery, etc.

Instrument	Activity	Frequency

Table 7
Calibration and Corrective Action - Field Equipment

Identify all tools, gauges, instruments, and other equipment used for data collection activities that must be calibrated to maintain performance within specified limits.

Instrument	Calibration Standards	Frequency Initial & Continuing Calibration	Acceptance Criteria	Corrective Action

APPENDIX A
Standard Operating Procedures

APPENDIX B

Laboratory Qualifications Package

(The proposed laboratory's Laboratory QA Manual may be included in this appendix, in lieu of completion of the following sections)

Title and Approval Page

_____

Name of Laboratory

_____

Address and Telephone Number

_____

Day/Month/Year

Laboratory Director:_____

Signature

_____

Printed Name/Date

Laboratory QA Officer:_____

Signature

_____

Printed Name/Date

TABLE OF CONTENTS

ORGANIZATION AND MANAGEMENT

A1 QUALITY POLICY

Include a quality policy statement, that includes objectives and commitments by top management.

A2 PROJECT ORGANIZATION AND RESPONSIBILITY

Develop an organizational chart that identifies the chain of command of each person in the bulleted list. Include titles and responsibilities of all laboratory personnel. Attach the laboratory's organizational chart. The organizational chart should be labeled Figure 1.1.

The organizational chart provided in Figure 1.1 identifies the individuals responsible for:

Laboratory Management
- Quality Management
- Systems auditing (on-site evaluations).
- Performance auditing.
- Laboratory analyses.

Sample Custody
- Laboratory QC.
- Data processing activities.
- Data processing QC.
- Data quality review.

Certain key individuals may be responsible for more than one of the aforementioned project functions. The organizational chart provides sufficient evidence that the lines of authority for all personnel is appropriate to accomplish the QA objectives of this project. All personnel have the necessary education, training, technical knowledge and experience for their assigned functions. Records on the relevant qualifications, training, skills and experience of the technical personnel are available upon request.

LABORATORY FACILITIES

B1 ACCOMMODATION AND ENVIRONMENT

Laboratory accommodations, calibration and test areas provide sufficient energy sources, lighting, heating and ventilation to facilitate proper performance of instrument calibrations and tests. The environment in which these activities occur are monitored and controlled to ensure that the accuracy of the measurements are sufficient to meet project requirements. Access to and use of all areas affecting the quality of these activities are controlled. *Include a copy of the laboratory floor plan. Label the floor plan as Figure 1.2.* The laboratory floor plan is included in Figure 1.2.

B2 EQUIPMENT

The laboratory is furnished with all equipment (including reference materials) required for the correct performance of calibrations and tests. . Any equipment which gives suspicious results, or has been shown by verification or otherwise to be defective, shall be taken out of service, clearly identified and wherever possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily.

Records shall be maintained of each item of equipment and all reference materials significant to the calibrations or tests performed. The records shall include:

the name of the item of equipment;
the manufacturer's name, type identification and serial number
date received and data placed in service;
current location, where appropriate;
copy of the manufacturer's instructions, where available;
details of maintenance carried out to date and planned for the future;
history of any damage, malfunction, modification or repair.

A list of all laboratory equipment which will be used during this project is found in Table 1.

MEASUREMENT /DATA ACQUISITION

C1 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the particular sample, and delineate the following information:

Site name and designated project number.
Sample identification number.
Date and time the sample was collected.
Sample preservation method.
Sample pH.
Analysis requested.
Sampling location.

All samples will be maintained in accordance with the following chain of custody procedures. A sample is under custody when it is:

In a person's physical possession
In view of that person after he/she has taken possession
Secured by that person so that no one can tamper with the sample
Secured by that person in an area which is restricted to authorized personnel.

A chain-of-custody record will always be maintained from the time of sample collection until final deposition. An example of an internal chain of custody form is found in *Figure 1*. *(Attach a copy of a blank chain of custody form and label as Figure 1)*. Every transfer of custody will be noted and signed for with a copy of the record being kept for each individual which endorsed it. At a minimum, the chain-of-custody record will include the following information:

- Contractor name and address.
- Sample identification number.
  Sample location.
  Sample collection date and time.
  Sample information, i.e., matrix, number of bottles collected, container type, etc.
  Names and signatures of samplers.
  Signatures of all individuals who have had custody of the samples

Describe how sample custody will be maintained within the laboratory. Specify the procedures for sample handling, storage, disbursement of samples for analysis and disposal.

C2 ANALYTICAL METHODS REQUIREMENTS

Table 2 details the analytical methods that will be used to analyze samples for this project. *EPA considers most methods developed by ASTM, NIOSH and APHA/AWWA/WEF (Standard Methods for the Examination of Water and Wastewater) EPA approved methods.* The laboratory will comply with the technical holding time requirements specified in Table 4 of the QAPP for this Investigation.

C3 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Measurement Quality Objectives are typically assessed by evaluating PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability). PARCC is defined as:

- Precision; a measure of the reproducibility of analyses under a given set of conditions.
- Accuracy; a measure of the bias that exists in a measurement system.
- Representativeness; the degree sampling data accurately and precisely depict selected characteristics.
- Completeness; the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under "normal" conditions.
- Comparability; the degree of confidence with which one data set can be compared to another.

To assess if environmental monitoring measurements are of an appropriate quality, the general PARCC requirements Measurement Quality Objectives (MQOs) for precision, accuracy and completeness will be compared to the measurement performance criteria. The precision and accuracy of the proposed analytical methods is found in Table 2.

C4 QUALITY CONTROL REQUIREMENTS

Analytical quality control requirements found in Table 3 will be followed for all samples analyzed for this investigation.

C5 INSTRUMENT/EQUIPMENT MAINTENANCE REQUIREMENTS

All analytical equipment will be maintained in accordance with each respective instrument manufacturer's operating instructions. All maintenance activities will be recorded in a log book. The preventive maintenance information found in Table 4 will be used. When the acceptance criteria is not met, the corrective action found in Table 4 will be implemented.

Describe the availability of spare parts identified in the manufacturer's operating instructions. Identify the source of routine maintenance and repair.

C6 INSTRUMENT CALIBRATION AND FREQUENCY

All laboratory equipment will be calibrated following the procedures found in Table 5. When the acceptance criteria is not met, the corrective actions found in Table 5 will be implemented.

C7 DATA MANAGEMENT

1.0 Laboratory Records

The results of each calibration and test method carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively. The records shall include the identity of personnel involved in sampling, preparation, calibration or testing. The records for each calibration and test shall contain sufficient information to permit their repetition. The laboratory will retain all original observations, calculations and derived data, calibration records and test reports for a period of *(include number of years)* ___ years. All records shall be stored, held secure and in confidence to the client.

1.2 Standard Operating Procedures (SOPs)

Copies of SOPs for all EPA approved analytical methods that have been modified and/or non-EPA approved methods are included in Section A. Copies of other SOPs are available upon request.

1.3 Analytical Data Deliverable Requirements

At a minimum, analytical data deliverable packages for screening and definitive data will include the following:

Sample documentation (location, date and time of collection and analysis, etc.)
Chain of custody
Initial and continuing calibration
Determination and documentation of detection limits
Analyte(s) identification
Analyte(s) quantitation
QC blanks
Matrix spike recoveries
Quality Control sample results
Duplicate results

Prior to the submission of laboratory data, the laboratory's Quality Assurance Officer will review the data for accuracy, precision and completeness.

1.4 Data Management

Describe the project data management scheme, tracing the path of the data from their generation in the field or laboratory to their final use or storage. ***A flowchart may be used.*** *Describe the record keeping procedures and the approach used for data storage and/or retrieval on electronic media. Discuss the control mechanism for detecting and correcting errors and for preventing loss of data during data reduction, data reporting and data entry. Identify and describe all data handling equipment and procedures to process, compile and analyze data. Describe the procedures that will be followed to demonstrate acceptability of hardware/software configurations required.*

ASSESSMENT AND OVERSIGHT

D1 PERFORMANCE AND SYSTEM AUDITS

The laboratory shall arrange for audits of the activities at appropriate intervals to verify that its operations continue to comply with the requirements of the laboratory's documented quality system. Audits will be carried out by *identify title of person responsible for system audits*, who is trained and qualified and independent of the activity to be audited. Audit reports will be distributed to *identify title(s) of persons who will receive the system audit reports.* When the results of a system audit indicate that the laboratory's quality system has been compromised, the laboratory will take immediate corrective action. *Describe the corrective action procedures to be followed.* If corrective action is required, the laboratory will immediately notify, in writing, the Project's QA Manager.

In addition to periodic system audits, the laboratory will also participate in proficiency testing or other inter-laboratory comparisons. The results of the laboratory's most recent EPA or equivalent Performance Evaluation Sample(s) are found in Section B. *Place a copy of the laboratory's most recent EPA or equivalent PE Sample results in Section B. Also, include copies of laboratory certifications for the compounds that will be measured during this investigation.* When the results of a performance audit indicate that the laboratory's validity of test results are questionable, the laboratory will take immediate corrective action. *Describe the corrective action procedures to be followed.* If corrective action is required, the laboratory will immediately notify, in writing, the Project's QA Manager.

DATA REVIEW AND USABILITY

E1 REVIEW OF ANALYTICAL DATA

Describe the procedures being used to review analytical data to ensure that reported results comply with the requirements found in Table 2 and 3 of this Appendix. Identify the job title(s) of persons responsible for each level of review. Also, describe the corrective action procedures that are followed when the reported results do not meet the laboratory's acceptance criteria.

E2 DATA VALIDATION

The laboratory's analytical deliverable package will include a narrative, which describes the analyses performed and discusses any problems associated with the data reported. Sufficient documentation (i.e., blank results, QC summary forms, instrument run logs, sample preparation logs, etc.) will be provided to allow the data from this project to be validated in accordance with the IM1 and M2 level of validation found in the Region III Innovative Approaches to Data Review Guidance Document. (6/95)

E3 RECONCILIATION WITH USER REQUIREMENTS

The laboratory will use the formulas included in Section D3 of the project's QAPP to evaluate quality control samples. *Describe other procedures (i.e., Shewart charts, standard deviation, etc.) that are being used to evaluate quality control samples.*

TABLES

TABLE 1
Laboratory Equipment List

Identify all laboratory equipment that will be used for this project

Name of Equipment	Manufacturer	Placed in Service (month/yr)	Location

TABLE 2
Analytical Methods Requirements

Parameter	Matrix	Sample Preparation Method	Analytical Method	MDL[1]	PQL[1]	Precision (% RPD)	Accuracy (% Recovery)

[1]Include concentration units

TABLE 3
Analytical Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
Method Blank	One per twenty samples per matrix or one per day, whichever is more frequent.		
Duplicate	One per twenty samples per matrix or one per day, whichever is more frequent.		
MS/MSD	One per twenty samples per matrix or one per day, whichever is more frequent.		
Laboratory Control Samples			
Surrogates			

TABLE 4
Preventive Maintenance - Laboratory Equipment

Identify field equipment and/or systems requiring periodic preventive maintenance. Describe the activity, such as check the battery, etc.

Instrument	Activity	Frequency

Table 5
Calibration and Corrective Action -Laboratory Equipment

Identify all tools, gauges, instruments, and other equipment used for data collection activities that must be calibrated to maintain performance within specified limits.

Instrument	Calibration Standards	Frequency Initial & Continuing Calibration	Acceptance Criteria	Corrective Action

SECTION A

Standard Operating Procedures

SECTION B

Performance Evaluation Results